



NGV Technology Forum

**U.S. Department of Energy
Natural Gas Vehicle
Technology Forum
Leadership Committee Meeting
September 18, 2002**

Dennis Smith, DOE

Richard Parish, NREL

Douglas Horne, Consultant

Denny Stephens, Battelle



Meeting Objectives

NGV Technology Forum

- Update on DOE Activities since March 2002 NGV Stakeholder Meeting
- Review Purpose and Objectives of the NGV Technology Forum
- Review and Discuss Stakeholder issues and priorities
- Progress Report on DOE Portfolio of NGV support efforts
- Discuss Plans for Moving Forward



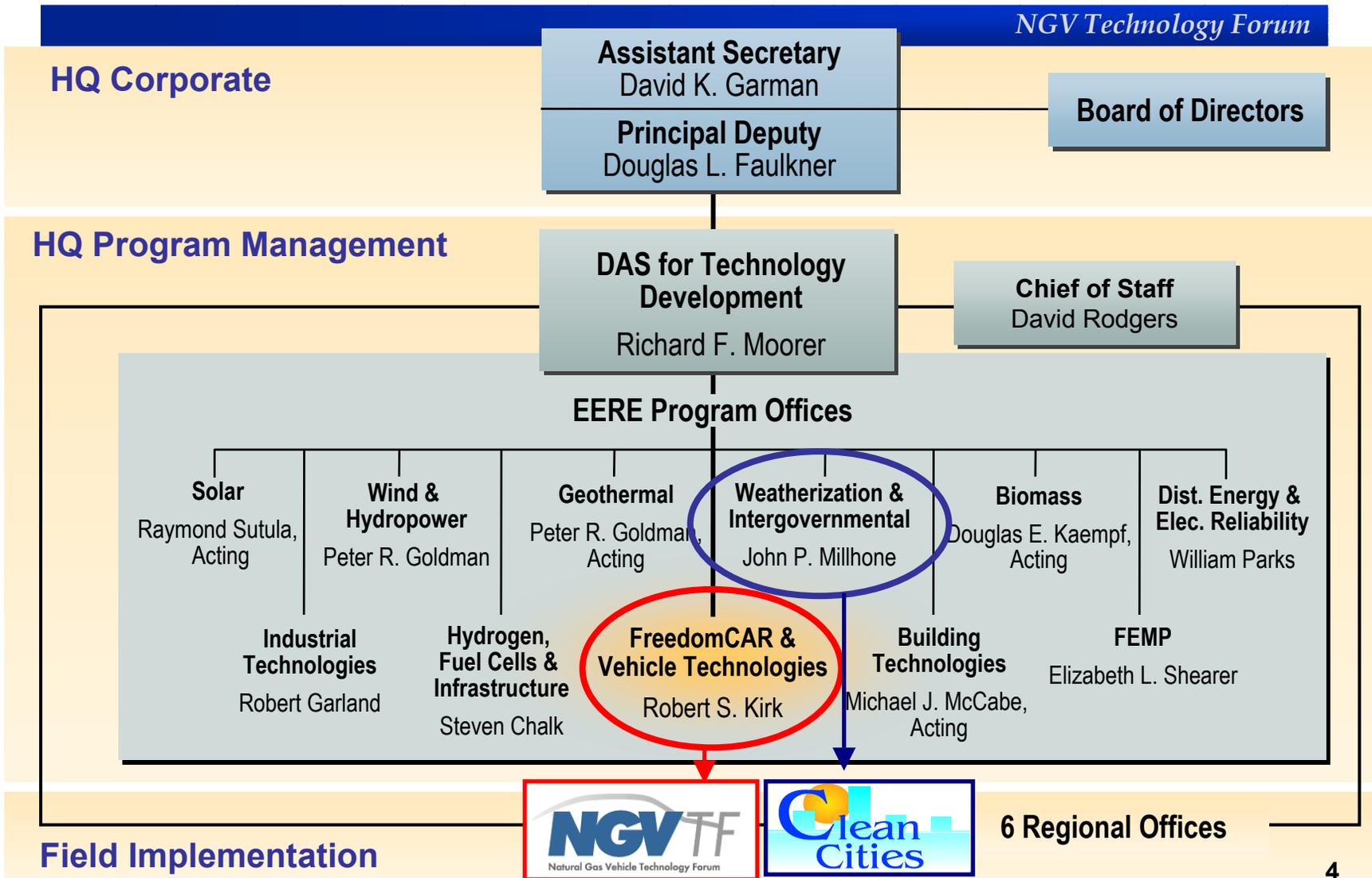
Meeting Agenda

NGV Technology Forum

- 8:30 a.m. Welcome and Introductions
- 8:45 a.m. Meeting Objectives and Overview
- 9:00 a.m. DOE Update
 - Reorganization
 - NGV Budget Status
- 9:45 a.m. Break
- 10:00 a.m. NGV Technology Forum Purpose
- 11:00 a.m. NGV Stakeholder Visits and Discussions
- 11:45 The California Experience
- 12:00 p.m. Lunch
- 1:00 p.m. Progress Report on DOE Portfolio of NGV Support Efforts
- 2:30 p.m. Break
- 2:45 p.m. Open Discussion of NGV Stakeholder Strategic Priorities and Round Table Comments
- 4:00 p.m. Next Steps and Future Meeting Plans
- 4:30 p.m. Adjourn



DOE: Organization Update



Office of FreedomCAR and Vehicle Technologies



NGV Technology Forum

HQ Corporate

FreedomCAR & Vehicle Technologies
Robert S. Kirk

FreedomCAR Partnership
Edward Wall
Director

21st Century Truck Partnership
Kenneth Howden
Director

Chief Scientist
Dr. James Eberhardt

(Acting) TEAM LEADERS

Vehicle Systems
Robert Kost

Advanced Materials
Rogelio Sullivan

Fuels, Lubricants & EPACT
Stephen Goguen

Combustion and Emission Control
Gurpreet Singh

TEAMS

- Sidney Diamond (.5)
- Tien Duong
- David Hamilton
- Susan Rogers
- Lee Slezak
- Richard Wares

- Sidney Diamond (.5)
- Joseph Carpenter

- **Dennis Smith**
- Kevin Stork
- Linda Bluestein
- Shab Fardanesh
- Dana O'Hara

- Kathi Epping
- John Fairbanks
- Roland Gravel
- Pat Sutton



Budget Status FY-2003



NGV Technology Forum

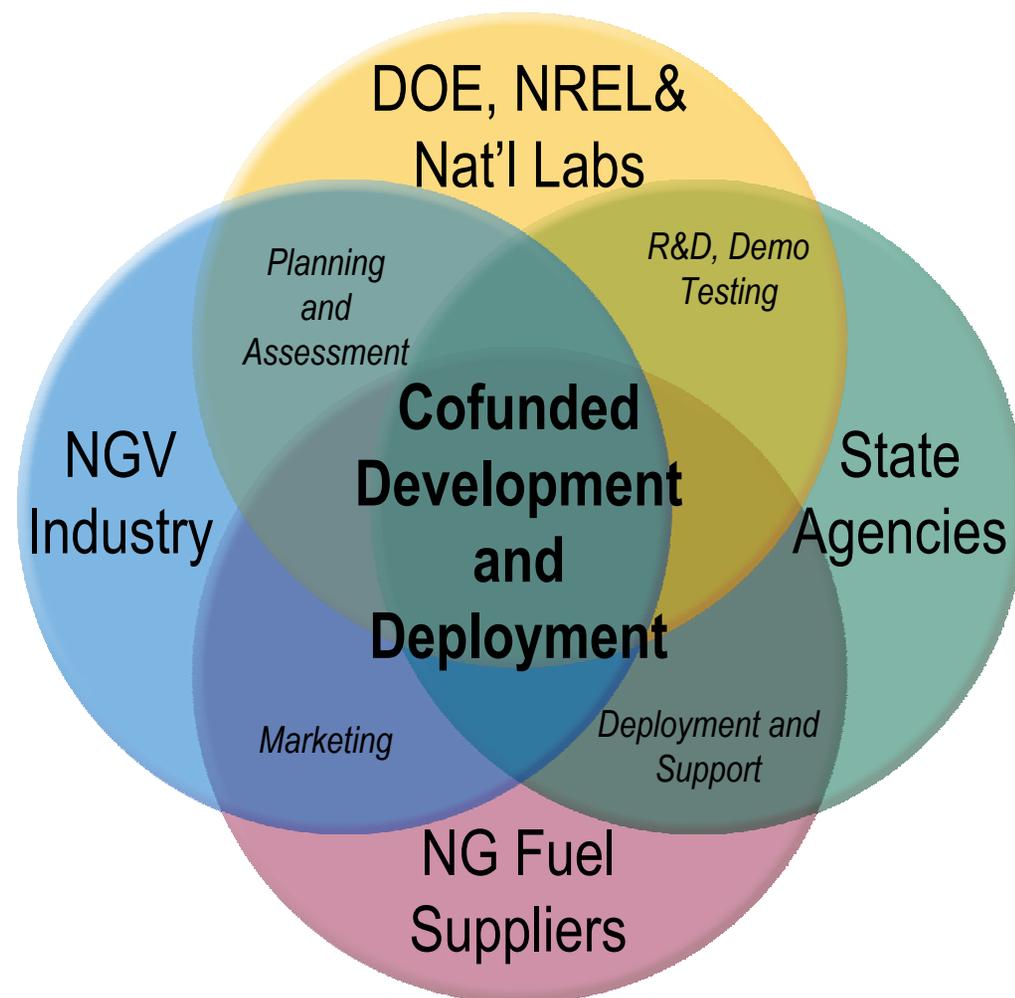
| | <u>U.S. House mark</u> | <u>Activity</u> | <u>U.S. Senate mark</u> |
|----------------------|------------------------|--|-------------------------|
| Natural Gas | 2,000 | Medium Duty trucks | 3,000 |
| | 2,000 | Heavy Duty trucks | 3,000 |
| | 2,000 | Infrastructure | 2,000 |
| All Alt-fuels | 12,000 |  | 11,000 |

(dollars x 1000)

The Funding Challenge

NGV Technology Forum

- Resources are limited
- One organization cannot fund all phases of research, development and deployment of new technology and vehicles
- All parties want to leverage resources
- Participants must find overlaps in objectives to cofund elements which meet common goals





Messages from the March 14 NGV Stakeholder Meeting



NGV Technology Forum

- Received broad support and encouragement for DOE NGV Efforts
 - Heard serious frustration with limited budget for R&D and deployment
- Strong need for communication and coordination of NGV activities on a national basis including other states and California
 - Need OEM and Senior Leadership Participation
 - Build on past success with RD&D Plan, Infrastructure and NGNGV Working Groups
- Need a comprehensive, consistent and coordinated effort championed by DOE, not fragmented or reluctant
 - Need to link RD&D funding to deployment needs to ensure effective resource use



Messages from the March 14 NGV Stakeholder Meeting



NGV Technology Forum

- Vehicle platforms and engine technology needs
 - More vehicle platforms for fleet rules and high fuel use fleets
 - A front engine (type C) school bus
 - Light duty vehicle technology as well as medium and heavy duty
 - Address near term obstacles as well as long term R&D
 - Continuing improvement in engine development to meet emissions standards and exceed diesel achievements
- Fueling infrastructure needs
 - More fueling infrastructure
 - Need a strategy to bridge to the “Hydrogen Future”
- Time is of the essence



Important Results



NGV Technology Forum

We are Listening ... and Paying Attention !

- DOE values the input and support for its NGV activities voiced at the March 14 NGV Stakeholders Meeting and since then
- Building on that support DOE is updating and reinvigorating its NGV support efforts
 - Updated scope will be more comprehensive, including
 - » Vehicles and infrastructure
 - » Near term obstacles as well as continuing technology development
 - » Light, medium and heavy-duty vehicles
 - » Industry support such as safety education, working groups, fleet user groups and codes and standards
- Continuing interactions with industry and government stakeholders is critical



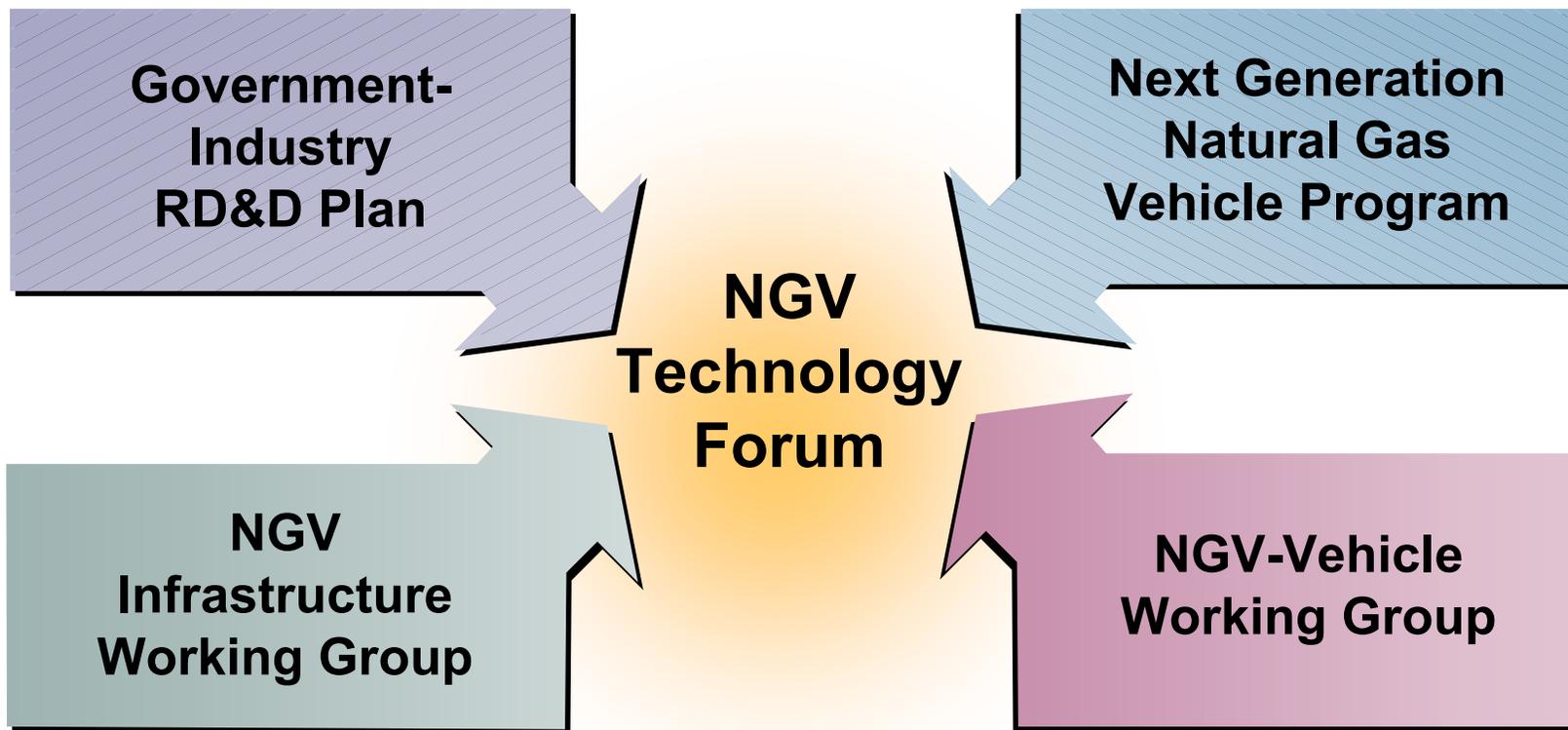
NGV Technology Forum Purpose

NGV Technology Forum

- There is significant value and benefit for all in communication and coordination of efforts by stakeholders with common interests
 - However, the DOE must avoid a real or apparent conflict of interest
- The purpose of the NGV Technology Forum is to
 - Communicate and share information among stakeholders with the common interest of advancing NGV technology to
 - » Maximize the impact of NGVs on **Reducing Foreign Oil Imports** and reducing criteria pollutants and toxics
 - » Use limited resources efficiently and effectively (Leverage)
 - » Encourage and support the development and deployment of enhanced NGV technologies for
 - Engines
 - Vehicle platforms
 - Fueling infrastructure
 - Overcoming technical barriers and obstacles

NGV Technology Forum Purpose

One objective of the Technology Forum is to consolidate prior efforts for more efficient and effective communication and coordination.





NGV Technology Forum Purpose

NGV Technology Forum

Three Venues for Communication and Coordination

LEADERSHIP Committee

- Discuss strategic directions and priorities
- Suggest funding approaches

New!

PROJECTS Coordination Team (Contracting Agencies)

- Confer on funding strategies
- Discuss management of RFPs and contracting
- Lead Technical Working Groups
- Support communications efforts

TECHNICAL Working Groups

- Review technology development and deployment
- Identify problems and obstacles
- Suggest technology enhancement needs

NGV Technology Forum Purpose

NGV Technology Forum

*DOE NGV
PROGRAM*



**PROJECTS
Coordination
Team**

**LEADERSHIP
Committee**

**TECHNICAL
Working
Groups**



Leadership Committee Purpose



NGV Technology Forum

- Meet periodically to share *strategic level* information and data on NGV technology trends, issues, barriers and needs
- Obtain information for assessment by DOE and participants so that they can allocate resources in the most efficient and effective manner
- Information exchange can enable participants to identify opportunities to cooperate and collaborate
- Participants to be invited include representatives of
 - Federal, State and Local Governmental Agencies
 - Engine and Vehicle OEMs
 - Fuel suppliers and retailers
 - Industry Consortia

All New!



Project Coordination Team Purpose



NGV Technology Forum

- Periodic meetings of contracting agencies to discuss and share *project level* information and data on NGV technology development and deployment trends, issues, barriers and needs, as well as RFPs and Contracts
- Obtain information for assessment by NREL and participants so that they can allocate resources in the most efficient and effective manner
- Information exchange can enable participants to identify opportunities to cooperate and collaborate
- Participants will include national laboratory partners, representatives of contracting agencies, and non-bidding stakeholders



Technical Working Group Purpose



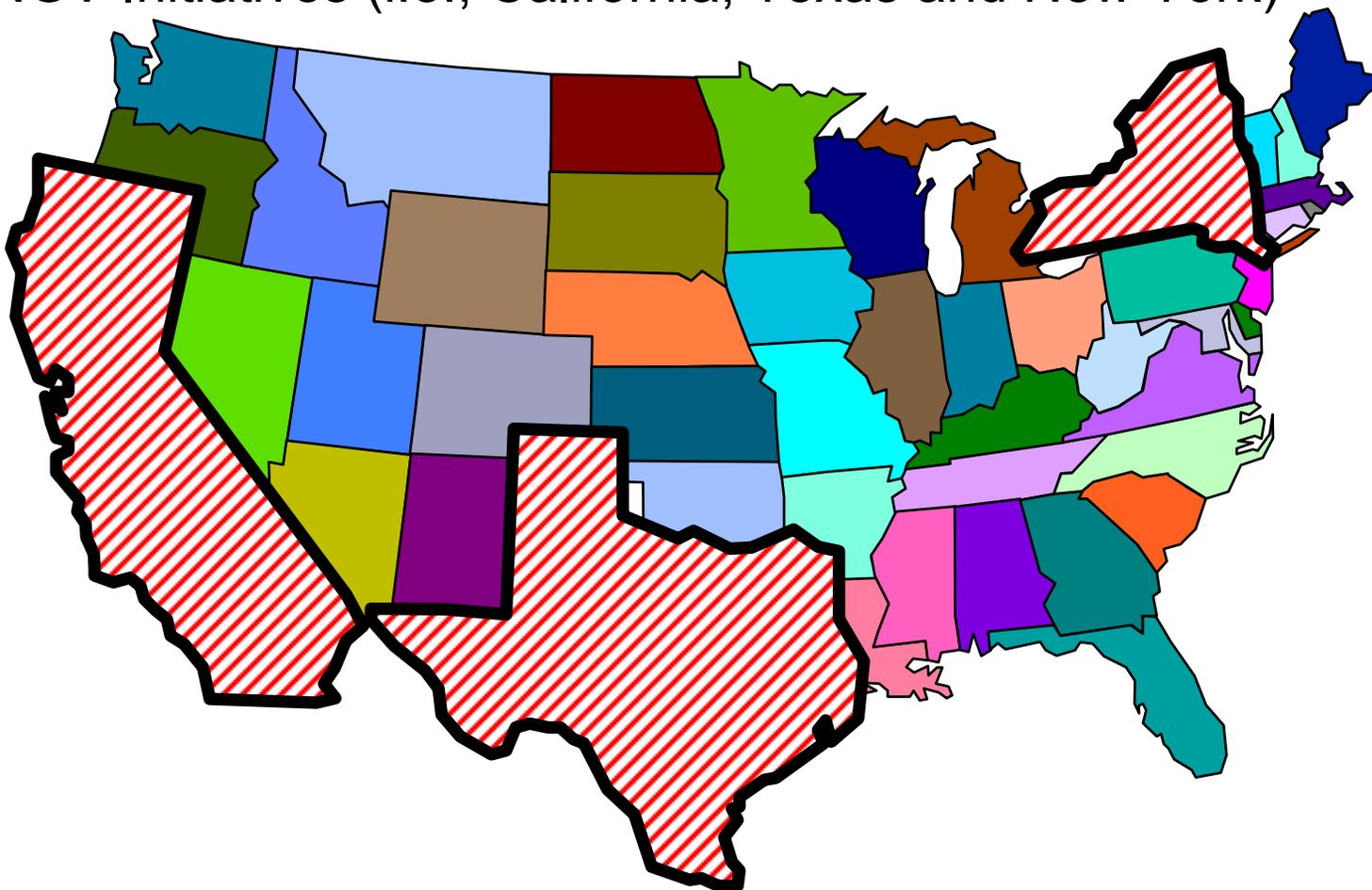
NGV Technology Forum

- Meet periodically in a technical conference format to present and share information and data on
 - Technology Development and Deployment progress
 - Technical barriers, obstacles and challenges to efficient and effective research, development and deployment of natural gas vehicles and infrastructure.
- Discuss technical priorities, recent customer feedback, success stories, and market needs
- Open to all interested parties

NGV Technology Forum Purpose

NGV Technology Forum

- A National Forum with Emphasis on regions with active NGV Initiatives (i.e.; California, Texas and New York)





NREL TF Outreach and Communications, Reporting to Stakeholders



NGV Technology Forum

Communications

- A variety of means will be used to communicate with stakeholders and interested parties including
 - A Website
 - Periodic E-mail newsletters and updates
 - Official Publications
 - Periodic stakeholder meetings and visits (often in conjunction with industry meetings)
 - Presentations at selected industry and government conferences (WNGVC)

Step 1: March 14 meeting



NGV Stakeholder Meetings and Priorities



NGV Technology Forum

Step 2: Stakeholder Visits and contacts

- ALT/JB Kelley
- Brookhaven National Laboratory
- CALSTART
- CARB
- California Energy Commission
- Clean Air Partners
- Cummins Westport
- Ecotrans
- ENRG
- Ford
- Honda
- John Deere
- KeySpan
- Natural Fuels
- NGVC
- NYSERDA
- PG&E
- Pinnacle CNG
- SCAQMD
- SoCal Gas
- SunLine Transit
- Texas Energy Conservation Office
- Texas Council Environmental Tech.
- Texas DOT



NGV Stakeholder Meetings and Priorities



NGV Technology Forum

Stakeholder Issues and Concerns

- Vehicles and Platforms
 - » Need more vehicle platforms ready for immediate purchase
 - » Need more platforms in development with OEM Warranty
 - » Need strategy for vehicle integration by qualified upfitters, warranted and supported by chassis OEMs
 - » Still need light and MD/HD dual fuel vehicles for emerging markets
 - » Need low cost front engine school bus for many markets
- Engines
 - » Increase the number of certified engines available for purchase
 - » Encourage EPA to streamline engine certification and finalize requirements
 - » Continue with NGNGV agenda to meet '04 and '07 EPA emissions requirements



NGV Stakeholder Meetings and Priorities



NGV Technology Forum

Stakeholder Issues and concerns

- Infrastructure
 - » Monitor performance of Small Scale Liquefaction efforts
 - » No major investment needed for conventional CNG infrastructure technology at this time
 - » Dwindling interest in convenience store approach to public refueling in favor of open access anchor fleet stations and *development of a low-cost home refueling unit*
 - » Concern that early adopters are left with outdated, unreliable and costly (operations) equipment
 - » A transition to Hydrogen strategy should be part of any infrastructure design and deployment



NGV Stakeholder Meetings and Priorities



NGV Technology Forum

Stakeholder Issues and concerns

- Emissions and Health Effects
 - » A “living” emissions document should be developed and maintained as a single source for all new developments – perhaps web based
 - » Work with EPA to recognize and give credit for NGV emissions reductions in SIPs and other planning processes
 - » Evaluate aldehyde issue, determine if action is needed and determine methods to resolve
 - » Examine nanoparticle issue, evaluate true health effects, develop methods of testing and enlist SI engine manufacturers in the effort
 - » Unburned methane is expected to become an issue for global warming



NGV Stakeholder Meetings and Priorities



NGV Technology Forum

Stakeholder issues and concerns

- Communications
 - » Develop new NGV “Strategy” document that includes a transition to hydrogen roadmap
 - » Encourage and support communication and sharing of information among all stakeholders
 - Create “case studies” and communicate lessons learned
 - Need regular reports from R&D contractors on progress
 - Maintain a database of projects in progress by all parties
 - List all technologies that have entered the marketplace and showcase success stories
 - » Continued support of codes and standards development
 - Support education of State and Local governments on NGV implementation requirements
 - Support international harmonization of codes and standards



NGV Stakeholder Meetings and Priorities



NGV Technology Forum

Stakeholder issues and concerns

- Deployment
 - » Focus on anchor tenants using 200,000 gal per year
 - » Install a minimum 300 scfm compressor (for sustainability)
 - » Provide open access to other customers (share stations)
 - » Coordinate infrastructure development with all stakeholders
 - » Focus on economically viable and sustainable markets that are supported with fleet rules, regulations and incentives
 - » Focus the funding and don't spread it too thin so that nothing gets accomplished
 - Review and evaluate SIP funding value for unsustainable markets (Get EPA to allow NGV emissions credits)
 - Encourage educated use of funds distributed by DOT for vehicles and infrastructure



NGV Stakeholder Meetings and Priorities



NGV Technology Forum

» Suggested fleet priorities

- High Fuel Use Fleets
 - Police
 - Taxi
 - Shared ride van
 - Refuse
 - Intrastate
 - Transit
 - Delivery i.e.. E450 cutaway
 - Airports fleets
- School Buses are not high fuel use, but are important for community relations, visibility and next generation education
- SCAQMD Fleet Rules
 - 1191-Light & Medium Duty Public Fleets
 - 1192 - Transit
 - 1193 - Refuse Collection Vehicles
 - 1194 - Commercial Airport Ground Access
 - 1195 - School Buses
 - 1196 - Heavy duty Public Fleet
 - 1186.1 - Less Polluting Sweepers



NGV Stakeholder Meetings and Priorities



NGV Technology Forum

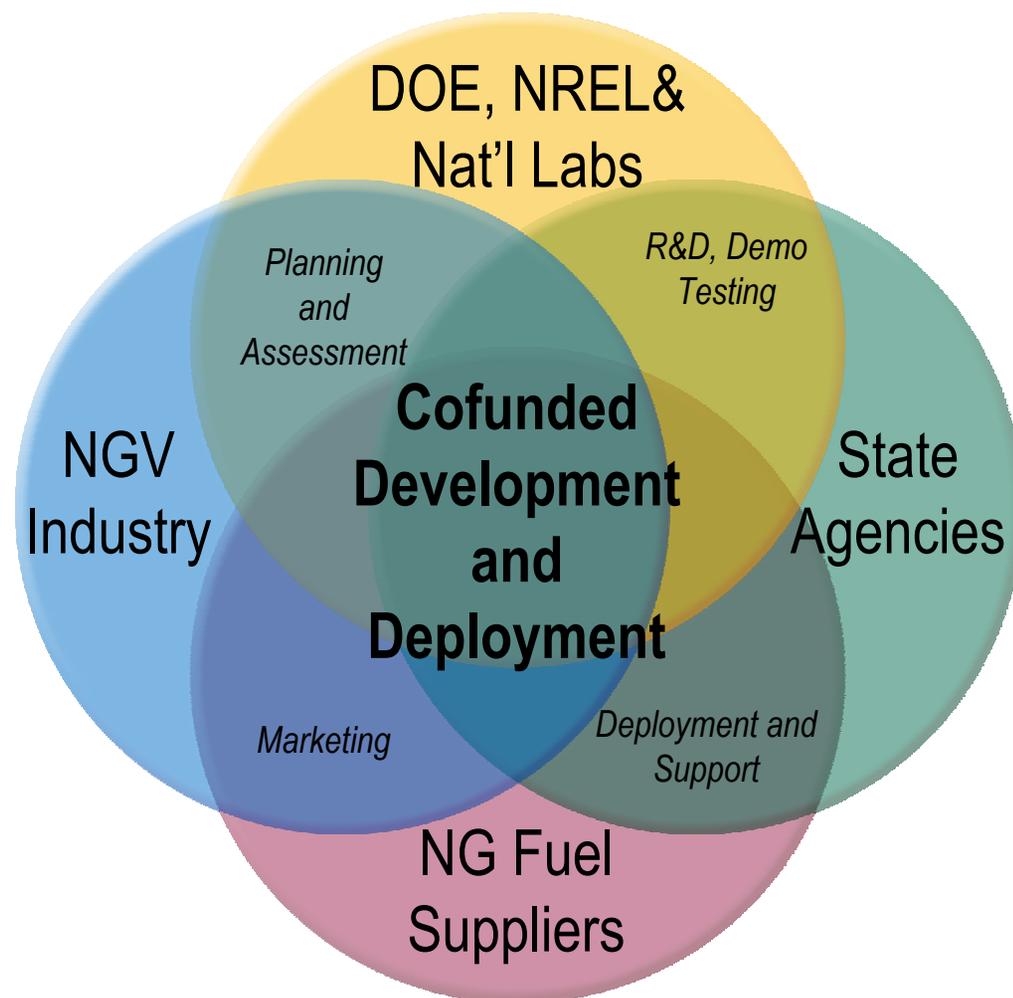
Stakeholders issues and concerns

- General comments
 - » DOE needs to focus its NGV program and develop consistency over time
 - » The NGV Technology Forum concept received strong support from those contacted
 - » DOE is the most appropriate entity to orchestrate a national effort to foster government/industry cooperation and provide centralized communications for the NGV community

The Funding Challenge

NGV Technology Forum

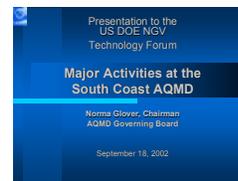
- Resources are limited
- One organization cannot fund all phases of research, development and deployment of new technology and vehicles
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- Participants must find overlaps in objectives to cofund elements which meet common goals





The California Experience

N. Glover





Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

- EPA emissions modeling assistance Argonne
- Next Generation NGV Engine and Platform Development Projects NREL
- LNG from Landfill Gas Brookhaven
- Infrastructure Working Group Projects Status GTI
- Tiger Teams NREL
- Field Operations Program and Natural Gas Vehicle Evaluations
- Clean Cities Support and other ongoing efforts DOE-HQ



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

EPA emissions modeling assistance

- Update of Air-Cred modeling program
- Inclusion of updated NGV emissions data in Mobile 6
- Will work with EPA to allow recognition and credit for NGV emissions reductions in SIP and other Air Quality planning processes

Argonne National Laboratory – Chris Saricks



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum



...Clean and Competitive

Kevin Walkowicz

NREL



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

NGNGV Update: Overview

- **This program is managed by:**
 - The National Renewable Energy Laboratory (Kevin Walkowicz)
 - » with support from Battelle (Denny Stephens)
- **This program is sponsored by:**
 - The U.S. Department of Energy, Office of FreedomCAR & Vehicle Technologies (Dennis Smith, Program Manager)
- **With co-funding and support from the**
 - California South Coast AQMD
 - California Energy Commission
- **And additional support and input from:**
 - GTI, PG&E, NGVC
 - The NGNGV Working Group
 - Customers and OEMs, and many others



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum



NGNGV Update: Program Targets

- Develop one new medium-duty (Class 3-6) compressed natural gas vehicle and one new heavy-duty (Class 7-8) liquefied natural gas vehicle which meet the 2007 emission targets and are commercially viable



- Develop Near Term Engines and Vehicles (1.5-1.8 g NO_x+NMHC) by 2003



- Develop MD 0.5 g/bhp-hr NO_x CNG vehicle by 2004

- Develop HD 0.5 g/bhp-hr NO_x LNG vehicle by 2004

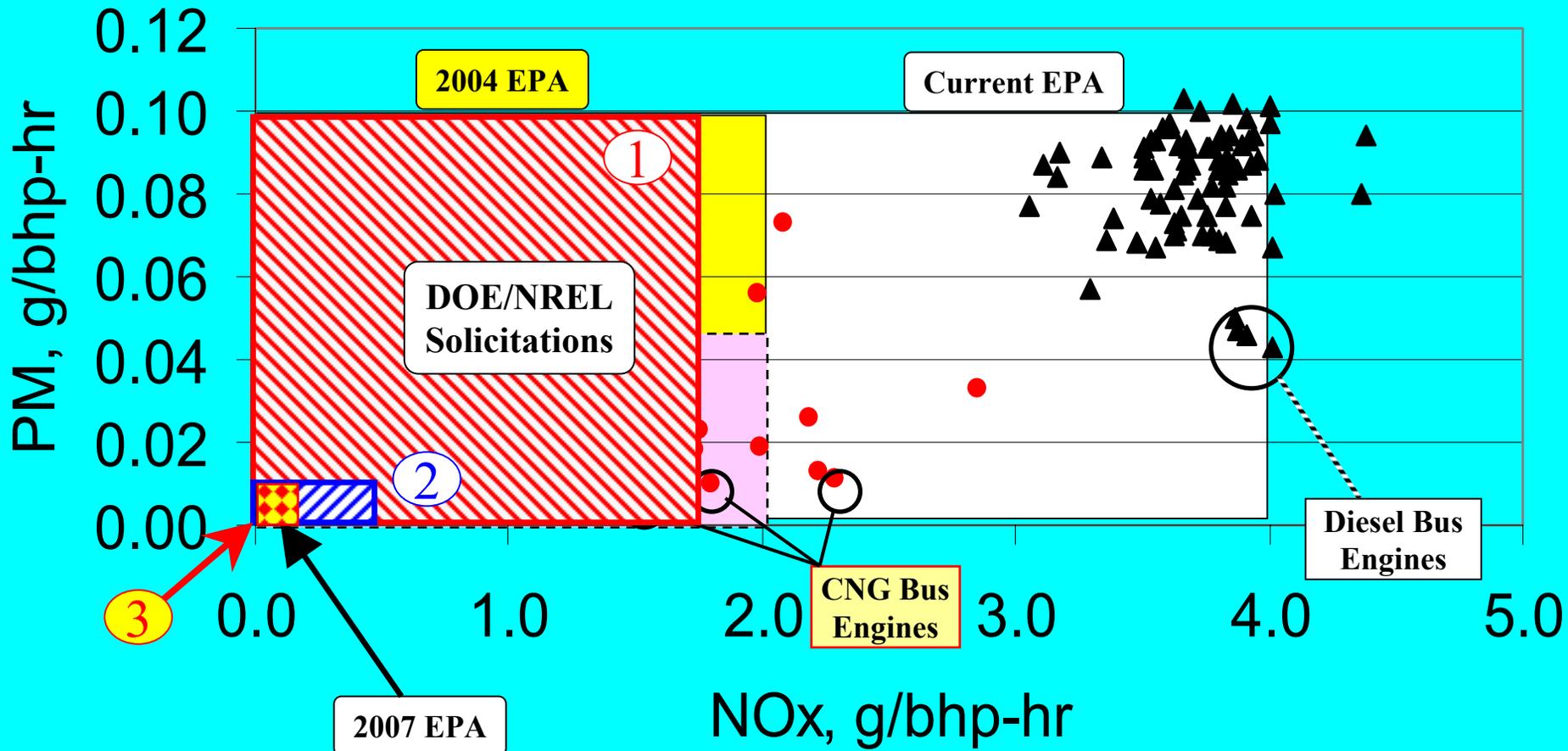


- Continue with necessary development to introduce MD & HD 0.2 g/bhp-hr NO_x vehicles by 2007

Emissions Targets and DOE Projects

▲ Diesel Engines • CNG Engines

2001-2 EPA
Certifications





Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

NGNGV Update: Summary of Projects

| Next Generation NGV Program ... Clean and Competitive | FY01 | FY02 | FY03 | FY04 | FY05 | FY06 | FY07 |
|---|------|------------------------|--------------------|------|------|------|------|
| NGNGV PHASE 1-Technology R & D | | | | | | | |
| Engine Technology Assessment and Demonstration | | NREL/DOE SCAQMD/CEC | | | | | |
| Market Assessment and Vehicle Design | | SCAQMD CEC | | | | | |
| NGNGV PHASE 2 - Near Term Engine and Vehicle Dev. | | | NREL/DOE SCAQMD | | | | |
| NGNGV PHASE 2 - 0.5 g/bhp-hr NO_x MD & HD Vehicle Dev. | | | NREL/DOE SCAQMD | | | | |
| NGNGV PHASE 2 - 2007 Capable MD and HD Engine Dev. | | | NREL/DOE SCAQMD | | | | |
| NGNGV - 2007 Capable MD and HD Vehicles (Planned) | | | | | ? | | |



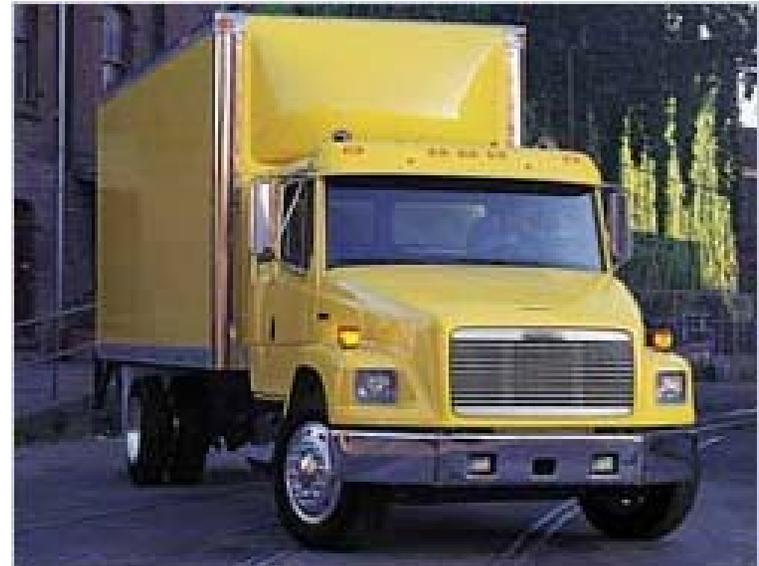
Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

- **NGNGV Update: Phase I: Technology R&D (in Progress)**
 - **Task A: Engine Technology Assessment and Demonstration**
 - » 5 Projects:
 - TeleFlex GFI: demonstration of a 6.0L GM engine with a three-way catalyst to achieve well below 0.2 g NO_x
 - Cummins Westport: demonstration of the 5.9+ engine with a lean NO_x adsorber to achieve 0.5 g NO_x
 - TIAX: demonstration of a catalyzed glow plug in a lean burn diesel engine to achieve 0.5 g NO_x and improved engine durability
 - Clean Air Partners: demonstration of Caterpillar C12 engine with both active and passive catalysts to achieve 0.2 g NO_x
 - **Task B: Market Assessment and Vehicle Design**
 - » 1 Project:
 - PACCAR/Cummins Westport: Market assessment and vehicle integration strategy to determine best overall market strategy for both 0.5 and 0.2 g NO_x vehicles

Platform Development Projects





Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

NGNGV Update: Platform Development (not yet contracted)

- Using “off the shelf”, commercial natural gas engines (Deere 8.1L)
 - » New Flyer transit bus (280hp) -
 - » Autocar/Volvo Expedito front loader refuse truck (280hp)
 - » Freightliner FL70 utility truck (250hp)
 - » Freightliner FL70 delivery truck (250hp)
- Contract is in final negotiation
- Vehicles should be ready for service by Fall 2003



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

NGNGV Update: Near Term Natural Gas Engine Development (1.5-1.8 g NO_x+NMHC) – not yet contracted

- Developing three new engines specifically for a school bus, pick up and delivery and refuse hauler which will be capable of certifying at NO_x + NMHC levels of 1.5-1.8 g/bhp-hr
- Engines will be developed by Engine OEMs and then field tested in a vehicle application to demonstrate commercial readiness and in-use performance
- Contracts are in final negotiations
- Engines should be ready for sale by late Fall 2003



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

NGNGV Update: Phase 2 : Engine and Vehicle Development (not yet contracted)

- **0.5 g NOx Vehicle Development – 2 awards:**
 - » MD: Dedicated CNG with a three way catalyst powering a bus chassis. 2 year project: develop engine, integrate into vehicle, demo in fleet. Will certifying at below 0.5g NOx at end of project.
 - » HD: Dedicated LNG with a three way catalyst, Variable geometry turbo, and EGR powering a refuse hauler and being demonstrated and tested by major refuse hauler. Will attempt to coordinate with landfill gas development effort.
- **2007 Capable Engine Development – 2 awards:**
 - » HD Engine: Utilizes advanced air/fuel control with EGR to maintain lean burn efficiency and utilize three way catalyst. 2 year project, available in 2005.
 - » MD Engine: Stoichiometric A/F, EGR, three way catalyst, variable geometry turbo and increased compression ratio. 2 year project, available in 2005.



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

Liquefied Natural Gas (LNG) from Landfill Gas (LFG)

Jim Wegrzyn

Brookhaven National Lab

For more information, check the following website: <http://www.trucks.doe.gov/research/fuel/index.html>



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

- Goal: Using landfill gas as a source of LNG for displacing petroleum
- Presentation:
 - Objectives
 - Background
 - Status



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

- Objectives:
 - Produce vehicle grade LNG at a cost of \$0.40/LNG gallon
 - Establish health and environmental benefits from using LNG on refuse haulers
 - Assist in developing LFG to LNG market growth



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

- Background:
 - Landfills are a cheap source of methane
 - Liquefier technology is well-developed
 - Cost-effective gas cleanup is a challenge
 - Maintenance, reliability, and operation costs are largely unknown



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

Status:

- DOE is supporting a 10,000 gal/day pilot LFG to LNG project at Arden, PA
(Waste Management and Applied LNG Technologies)
 - Gather operation, maintenance, reliability, and emission data
 - Commonwealth of Pennsylvania to cost-share \$1 million
- DOE is supporting a 1,000 gal CO₂ wash gas cleanup project at Burlington, NJ
(Acrion and Mack Trucks)
 - Evaluate gas cleanup technology to obtain vehicle grade LNG



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

Infrastructure Working Group Projects William Liss Gas Technology Institute





Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

Clean Cities Tiger Teams Field Operations Program Evaluations Richard Parish NREL



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

- **Clean Cities Tiger Teams**
 - Assist Clean Cities Coalitions and fleets with implementation of alternative fuel vehicles
 - Overcome persistent problems and major hurdles
 - NGV projects include:
 - » Definition of requirements for open card access at fueling stations
 - » AFV workshops (Texas and California)
 - » Medium/Heavy NGV market assessment
 - » NG Transit assistance (WMATA, Atlanta area, Training Guide)
 - » Evaluation of NG school bus needs
 - » AFVs at airports (Raleigh-Durham, Milwaukee)



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

Field Operations Program Evaluations

- Impartial evaluation of advanced technology vehicles including alternative fuel, electric, hybrid-electric, and fuel cell drive-trains
 - Completed report on transit experience with NG buses
 - NGVs currently being evaluated or planned
 - » Norcal LNG waste hauler
 - » Tempe transit LNG turbine hybrid electric bus
 - » Representative Clean Air Partners/Caterpillar fleet



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

FuelMaker Home Refueling Appliance (HRA)

- Failure Modes and Effects Analysis
 - Assess viability of residential fueling
 - Determine feasibility of indoor fueling
 - National Codes and Standards
- Vehicle Refueling Appliance performance review
 - Question current/previous users of VRA systems
 - Identify benefits or problems
- Installation and evaluation of future test units
- Future incentives will be considered under Clean Cities SEP program



Status Report on DOE Portfolio of NGV Support Efforts



NGV Technology Forum

Clean Cities and State Energy Program

Dennis Smith

U.S. DOE



NGV Technology Forum

Open Discussion of NGV Stakeholder Strategic Priorities and Round Table Comments



CEC Staff Position

NGV Technology Forum

Focus on NGNGV goals: Stay the Course

- Develop on Class 3-6 natural gas engine by 2007 (medium duty delivery van)
- Develop one Class 7-8 natural gas engine by 2007 (long-haul trucks)
- Meet prevailing emissions standards, while maintaining or improving performance
 - Horsepower
 - Torque
 - Fuel economy
- Reduce incremental vehicle costs over diesel engines

Class 3-6:

1997: \$11,000

2030: \$2,000

Class 7-8:

1997: \$45,000

2030: \$11,000



CEC Position

NGV Technology Forum

- Close the gap in incremental vehicle costs and fuel economy between diesel and natural gas engines by 2007
 - Incremental vehicle costs
 - » 2002: \$30,000 difference (Class 7-8)
 - » Expected cost of emission control: \$15-20,000
 - » 2007 and beyond: \$10,000 to \$15,000 difference
 - Fuel Economy
 - » 2002: diesels maintaining 15 to 20% fuel economy advantage over natural gas
 - » 2007: diesels will lose 5 to 15% in meeting emission standards



Next Steps and Future Meeting Plans



NGV Technology Forum

- Hold Technology Team Meetings after NGNGV Phase II contracts are announced, potentially December or January
- Rotate Leadership Team Meeting among key stakeholder locations, for example:
 - Winter 2003 in Albany, NY at NYSERDA
 - Fall 2003 in Austin, Texas
 - and periodically in DC scheduled around other NGV industry meetings

Group preferences ?



NGV Technology Forum

**U.S. Department of Energy
Natural Gas Vehicle
Technology Forum
Leadership Committee Meeting
September 18, 2002**

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